

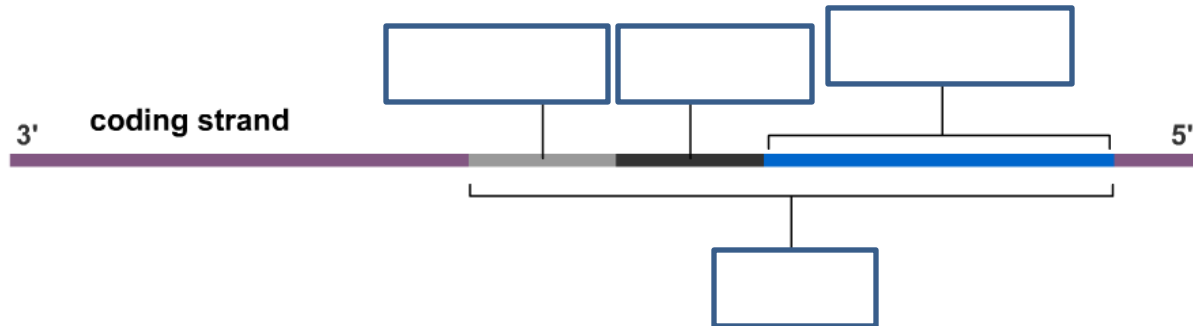
Name _____

Prokaryote Gene Regulation -

http://web.biosci.utexas.edu/psaxena/MicrobiologyAnimations/Animations/Operons/micro_operons.swf

Overview

Many bacterial genes are regulated in groups called _____. An operon consists of a _____, a regulatory element called an _____, and multiple _____ encoding _____ that are often involved in the _____ biochemical function, such as the catabolism of a specific _____ or the _____ of an _____. All of the structural genes of an operon are _____ into a single _____ molecule, which is then _____ into this entire _____ of _____. _____ operons are not _____ unless they are _____ by an _____, while _____ operons are _____ transcribed unless they are _____ by a _____.



1. How would you determine the directionality of this operon sequence if the numbers weren't provided?

Inducible Operon – The Lac Operon

2. What is the function of the lac operon regulatory gene?

3. How does the repressor work?

4. What happens to the repressor when lactose is present?

5. Why is lactose/allolactose called an activator?
6. What is produced by the lac structural genes?
7. Explain how this is a model of negative feedback.
8. How is this of benefit to bacteria in terms of energy conservation?

Repressible Operon – The Trp Operon

9. What is the function of the trp operon regulatory gene? Is this function different from the lac regulatory gene?
10. Explain how the repressor activity is initially different in the trp operon compared to the lac operon.
11. What is the result of the operon when tryptophan is not available?
12. What happens to the repressor when tryptophan is present?
13. What is the result of the operon productivity?
14. Explain how this is a model of negative feedback.

15. How is this of benefit to bacteria in terms of energy conservation?

16. Fill in the table of possible consequences for each mutation scenario.

| Mutation Locus | Consequences |
|-----------------------|---------------------|
| Lac Regulatory Gene | |
| Lac Operon Promoter | |
| Lac Operon Operator | |
| Lac Structural Genes | |
| Trp Regulatory Gene | |
| Trp Operon Promoter | |
| Trp Operon Operator | |
| Trp Structural Genes | |